



# Background, methods, and call for feedback on fuel and fire behavior data collection on active wildland fires

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## Background

### Monitoring Goals:

- Directly measure fuel treatment effectiveness
- Measure fire behavior and effects and their relationship to pre-fire fuels, fire history and treatments
- Measure effects of fire on archeological/biological resources
- Build dataset useful for calibration of consumption, smoke production and fire behavior models

Fire behavior measurements collected during active wildfires are paramount to fire behavior research (Butler *et al.* 2004). Many of the existing fire behavior models are based on laboratory data (i.e. Rothermel 1972; Viegas 2004), data collected during experimental burns (Alexander *et al.* 2004) or a combination of the two. Although not perfect, with advancements in technology it is possible to gather fire behavior data on actively burning wildland fires (Jimnez *et al.* 2007). A USDA Forest Service Enterprise Team, Adaptive Management Services, (AMSET), coordinates a module focused on collection of fire behavior data on wildland fire incidents, called the Fire Behavior Assessment Team (FBAT). FBAT can be ordered by a (U.S.) fire incident through the National Interagency Resource Ordering and Status System (ROSS), similar to other fire crews or overhead. The FBAT crew assimilates into incidents well due to the staff's high level of wildland fire experience, and the rapport the crew has with some Incident Management Teams.

The purpose of this poster is to outline the current methods and data variables collected in order to obtain feedback and to discern practical uses of this data with input from fire managers and the scientific community. Clearly identified and updated uses for FBAT fire behavior and fuels data will allow for streamlining or enhancing FBAT data collection methods. The FBAT program would like to continue into the future, but only with the most useful methods and with improvement feedback from the scientific and management communities on realistic applications of the data.

## Fuels Data

### Surface and ground fuels

- 1-3 Brown's planar-intercept for woody material
- Litter and duff measurements
- Maximum fuel bed depth

### Understory/ladder fuels

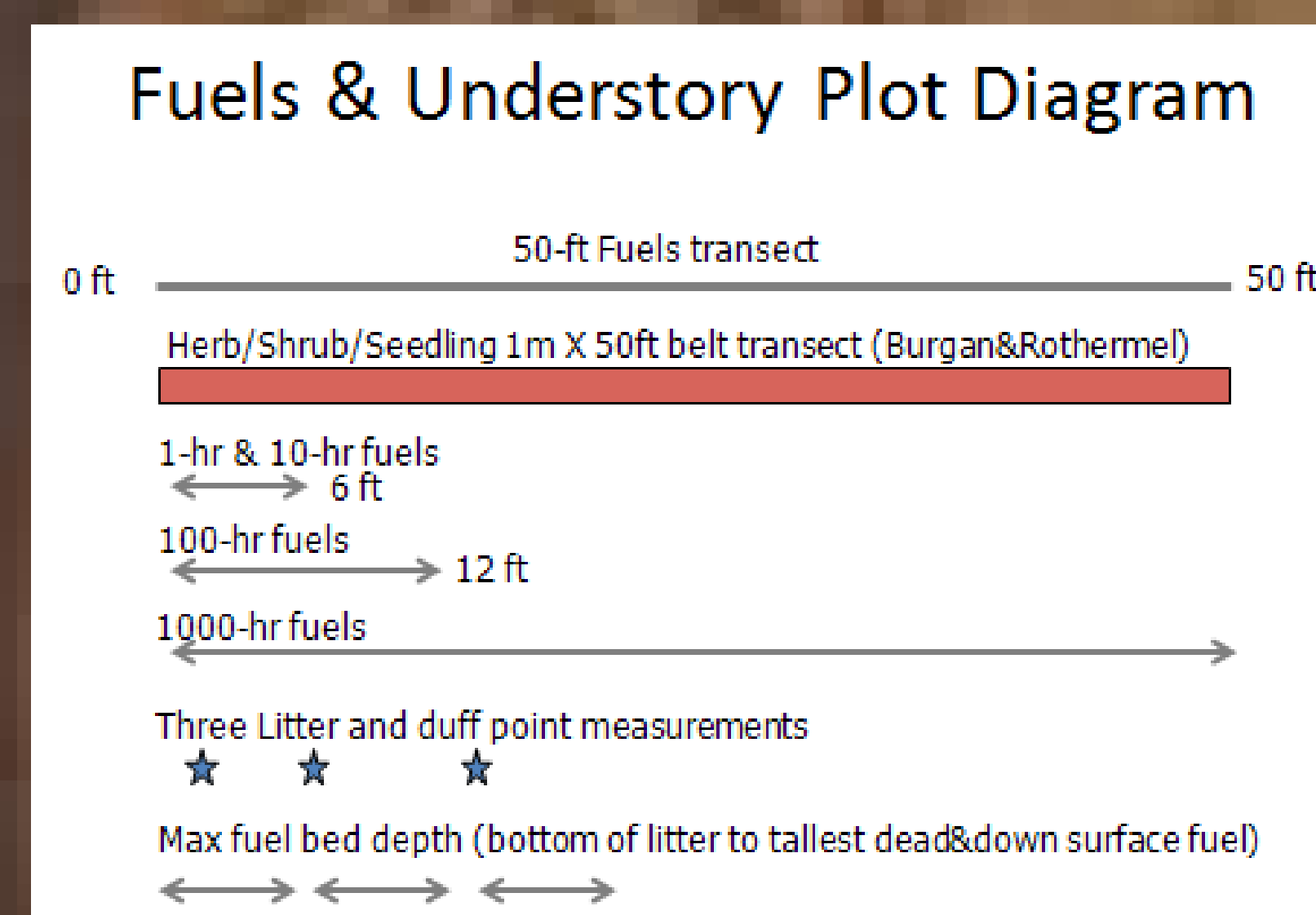
- Burgan and Rothermel method for understory vegetation (BEHAVE fuel subsystem; calculation tool by J. Scott)
- Height, type and density class for all shrubs, grasses, herbs and tree seedlings

### Crown fuels

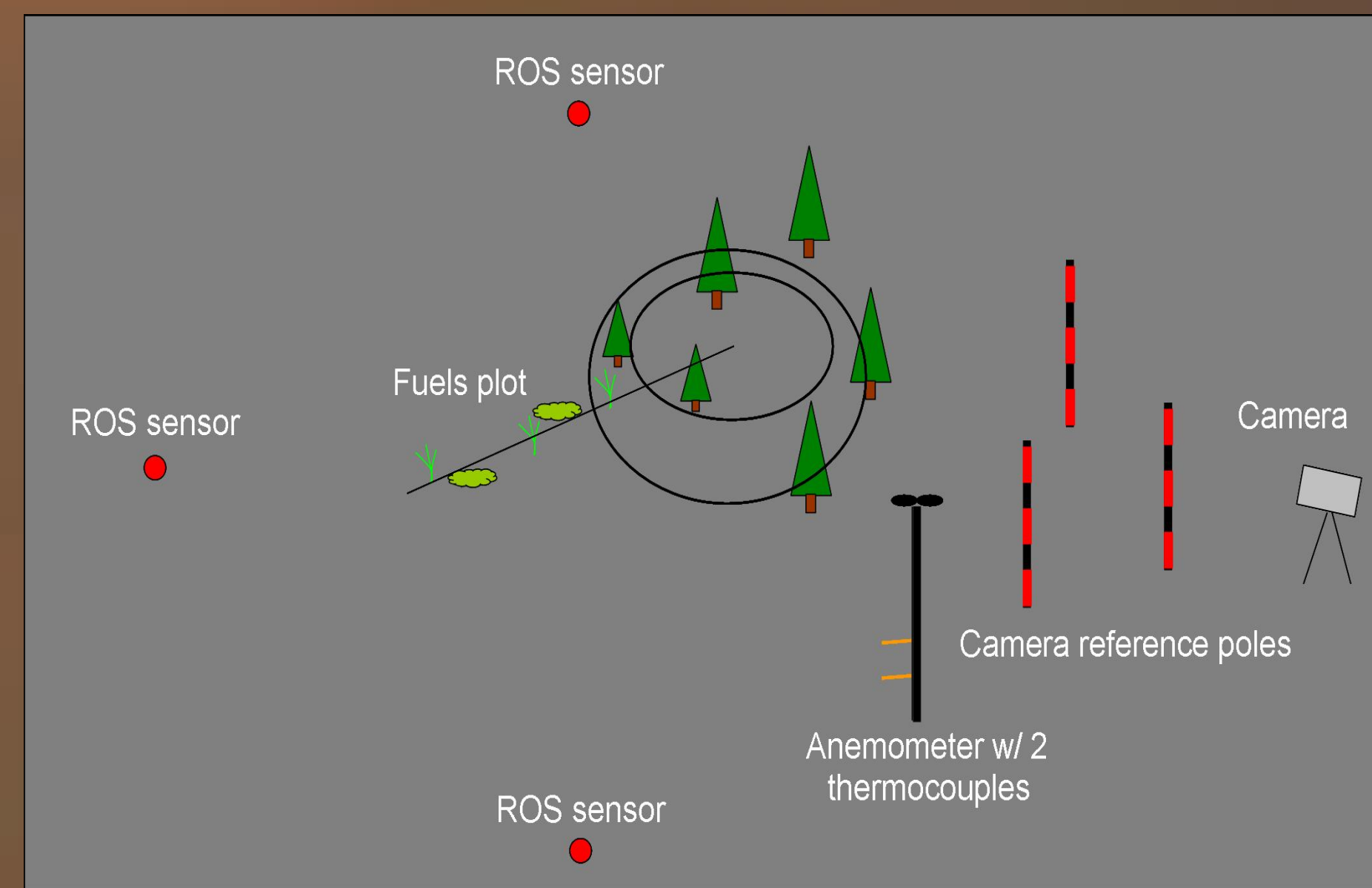
- Variable radius prism plots for pole-sized and overstory trees
- Species, DBH, height to crown base, total tree height, canopy class

### Fuel Moisture

- 3 samples of tree foliage and shrubs
- 2-3 samples litter and 1-hr, and 10-hr



## Plot Design



## Fire Behavior Data



### Cameras

- Wired thermistors trigger camera to start filming as the fire approaches
- 90 minutes of footage
- Camera reference poles used to assess flame length and ROS

### Rate of spread sensors

- ✓ Continuous temp. readings
- ✓ Triangulation used to calculate ROS

### Anemometer

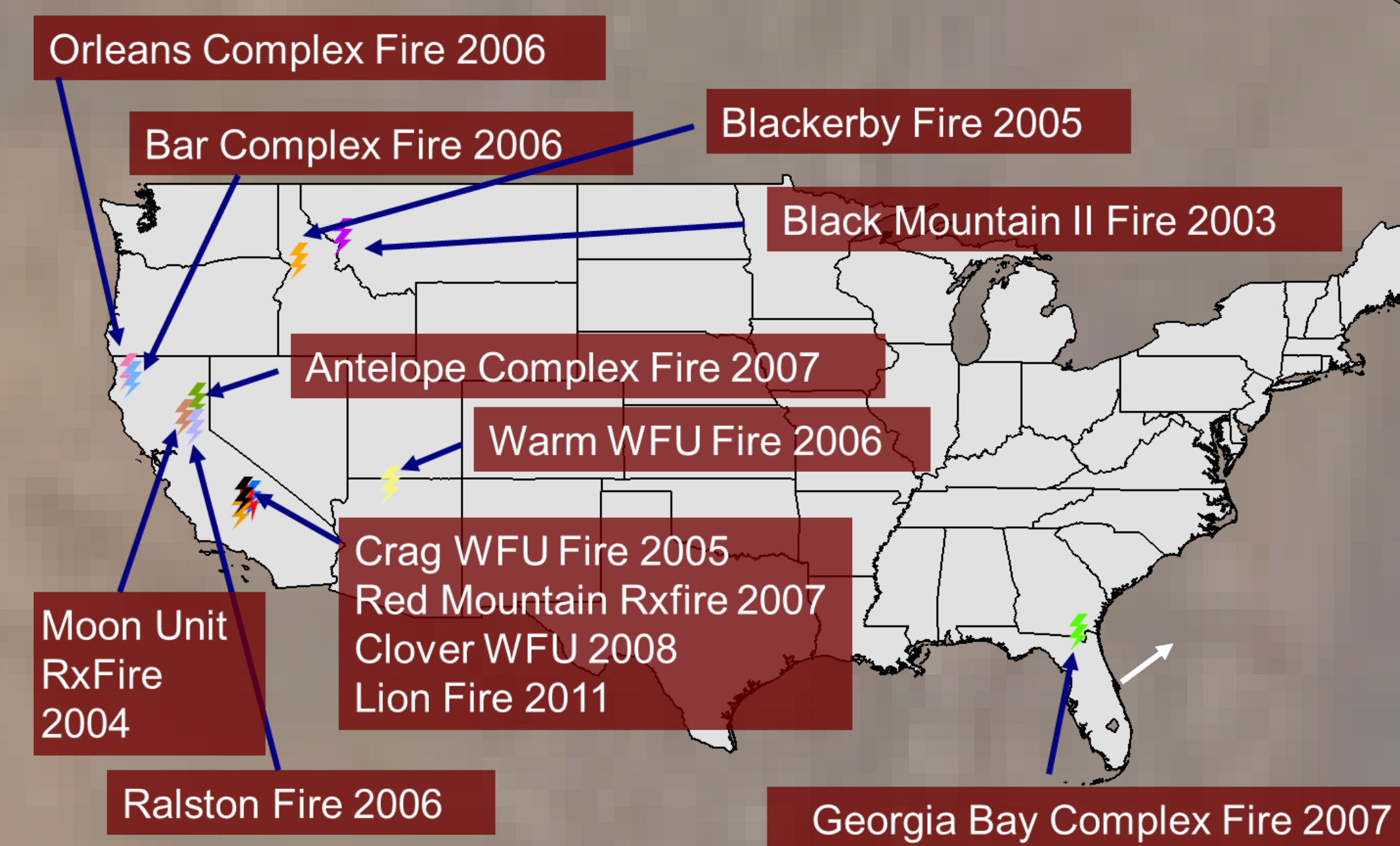
- ✓ Windspeed (until it melts)

### Thermocouples

- ✓ Multiple used to capture temp. at different heights



## Fires Visited 2003 to 2012



- 14 fires in 5 states
- 137 plot set-ups
- 115 sites burned
- 32 burned on Rx fires
- 105 burned on wildland fires

Types of fire behavior documented ranged from low intensity surface fire to active crown fire

## Fire Severity Data



- All fuel data is re-measured post-fire
- NPS burn severity protocol for understory and soils
- Post-fire char, scorch, and torch for trees

## Products and Collaborations

- Prepared incident reports on the effects of fuel treatments or past fires on fire behavior, fire effects, and archeological/biological resources.
- Loaned gear to San Dimas Technology and Development Center for a study on fire engine safety.
- Shared data with a project formulating estimates of Carbon stocks and greenhouse gas emissions in California forests.

## Future of the FBAT Program

- Seeking feedback on methods
- Exploring additional data uses and practicality of verifying/calibrating models/applications with FBAT dataset
- Collaborating with the Calaveras Wildland Fire Module starting fire season 2013
- Seeking funding for program maintenance

## Feedback or Questions?

Please contact us with feedback on methods, uses for data, and questions.

## How to Order FBAT

For Wildfire Incidents: Contact the FBAT leader, Carol Ewell, for availability 530-559-0070. Once availability is confirmed, FBAT provides a list of personnel to order through ROSS.

For other projects or prescribed fires: FBAT is part of a U.S. Forest Service Enterprise Team called Adaptive Management Services Enterprise Team (AMSET). Enterprise Teams are independent, financially self-sustaining US DA Forest Service units. We obtain the funding for the services we provide our clients through a document called a Work Order. Contact Carol Ewell 530-559-0070 or Alicia Reiner 530-559-4860 for more information.